
NI-2 Call By Call Service Selection

The National ISDN-2 (NI-2) Call By Call (CBC) Service Selection feature provides a standardized version of call by call service over an NI-2 TR-1268 interface¹, as defined in the Bellcore Technical Reference Specification TR-NWT-001270. It is intended that NI-2 CBC apply to all Class 5 type local exchanges complying with the NI-2 TR1270 standard.

Prior to the introduction of this feature, proprietary call by call capabilities were offered by Nortel's Integrated Services Access feature (ISA) Call By Call Type service for DMS switches (such as the DMS-100), and Lucent's Call By Call Service Selection for 5ESS Local Exchange Carriers. Table 63, "Differences between Nortel's ISA, Lucent's CBC, and NI-2 CBC," on page 516 provides a summary of the functional differences between the three offerings.

Note: The ISA Call By Call Type service and the NI-2 Call By Call Service Selection feature can co-exist on the same PBX.

NI-2 Call By Call Service Selection allows multiple service routes to share the same common pool of B-channels, rather than using dedicated routes that require each service route to have its own trunks. The channels are assigned to a service on a per call basis.

Figure 49 depicts a configuration using dedicated facilities, while Figure 50 shows an NI-2 Call By Call Service Selection configuration. Figure 51 provides a graphical representation of the NI-2 CBC master route and service routes.

1. The NI-2 Call By Call Service Selection feature provides all of the NI-2 TR-1268 Basic Call services introduced in Release 21. Please refer to the 'National ISDN-2 TR-1268 PRI Interface' feature module in the 553-2901-100 NTP for a description of the services that are offered.

Figure 49
Dedicated facilities configuration

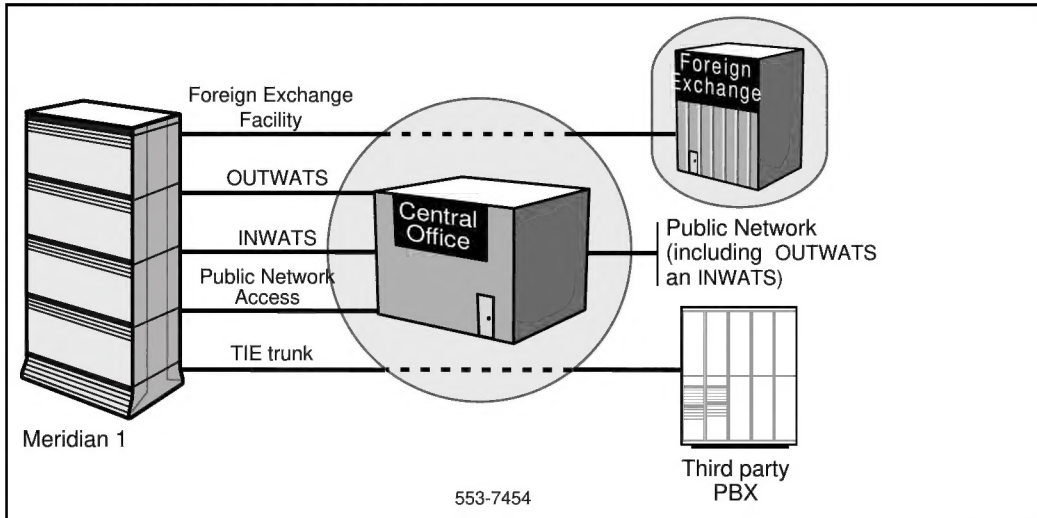


Figure 50
NI-2 Call By Call Service Selection configuration

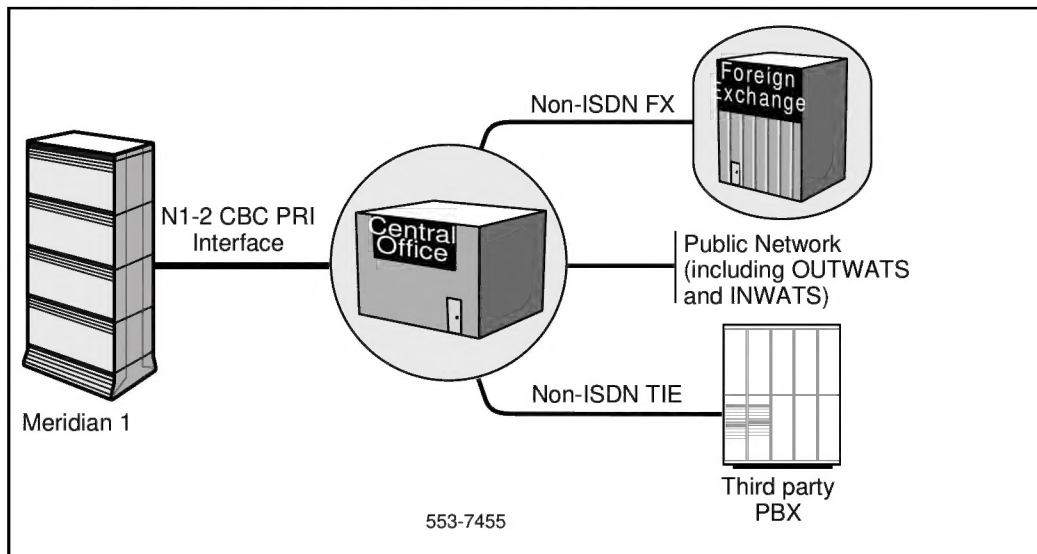
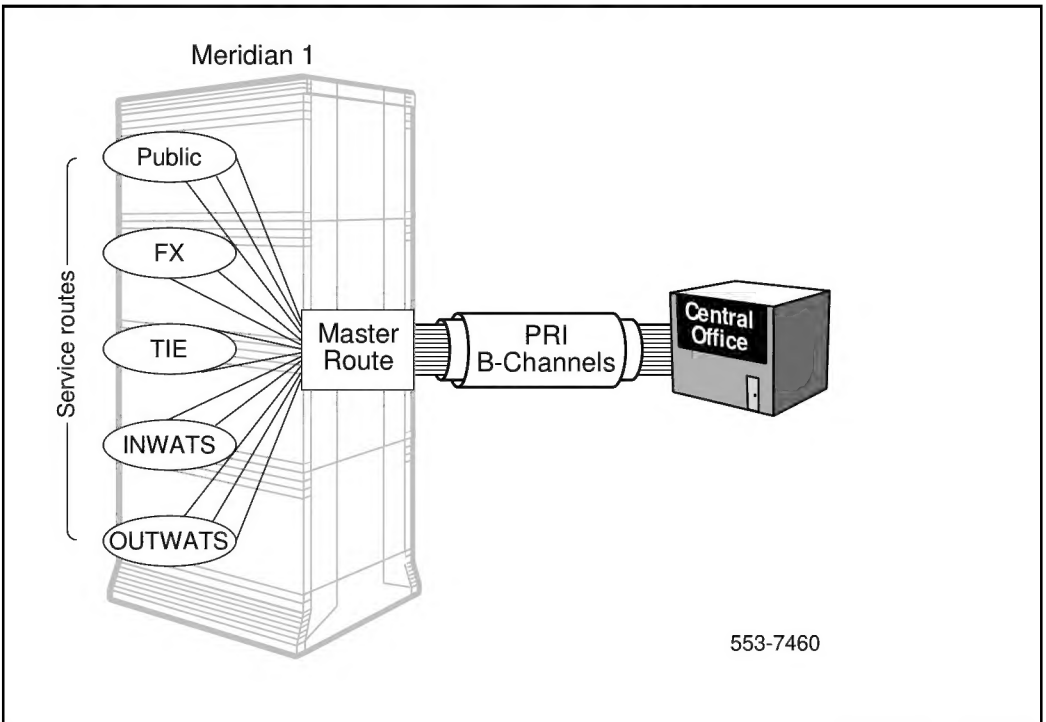


Figure 51
NI-2 CBC master route and service routes on the Meridian 1



Provisioning a master route and service routes

NI-2 Call By Call Service Selection is provisioned by configuring a trunk route as an NI-2 Call By Call Service Selection master route, and associated service routes. A master route contains a list of B-channels (trunks) to be shared by the different service routes. Service routes do not have dedicated trunks. They are associated with the master route and share trunks for different Call By Call services. Calls from the Central Office to the Meridian 1 are offered over the CBC master route.

The NI-2 CBC master route is defined in Overlay 16. The associated list of B-channels (trunks) is defined using Overlay 14. Then, the service routes are configured, also using Overlay 16. When configuring the service routes, the type of service to be carried over the B-channels for the NI-2 PRI interface is defined as a decimal value, as follows:

0 = Public call service (No Network Specific Facility IE is sent, since COT/DID routes are used)

19 = FX (Foreign Exchange) service

20 = TIE service

17 = Inward Wide Area Telecommunications Service (INWATS) service

18 = Outward Wide Area Telecommunications Service (OUTWATS) service. Information pertaining to the band number and the Inter-Exchange Carrier is stored in the service route. Three OUTWATS services may be accessed:

- IntraLATA OUTWATS, provided by a local service provider
- InterLATA OUTWATS, provided by a carrier other than that of the local service provider and
- Banded OUTWATS, using bands which each represents a geographical area to which a subscriber can place a call at a special tariff level

Lucent proprietary call by call services are as follows (these values are defined in the facility coding field in the NSF IE in order for the Meridian 1 to recognize the Lucent call by call services):

- 00001 = Access to Virtual Private Network (such as Lucent's Software Defined Network service)
- 00010 = MEGACOM 800
- 00011 = MEGACOM
- 00110 = ACCUNET switched digital service
- 00111 = International long distance service
- 01000 = International 800
- 01011 = Electronic Tandem Network
- 01101 = Private Virtual Network
- 10000 = DIAL IT and Lucent MultiQuest

For each FX and TIE trunk service, a Facility Number is assigned.

The maximum number of trunks limited by each service route is entered when configuring the service routes. The maximum number of channels per service (a maximum value is required by the Bellcore Technical Reference Specification) is controlled by the Central Office, and assigned at the time of subscription. It is this value that must be entered in Overlay 16.

There is no minimum limit specified by the Bellcore Technical Reference Specification, therefore no minimum value is assigned by the Central Office, or defined on the Meridian 1.

Engineering consideration pertaining to service maximums

The maximum value of trunks defined for any service type cannot exceed the network maximum, but the total of all maximums combined may be greater than the network maximum.

For example, in a single 23B+D span, two service routes may be configured, each with a maximum of 15 trunks (B-channels). Even though the combined number of B-channels (30) is greater than the network maximum (23), a minimum of 8 B-channels would be left available for other service routes.

For an incoming call to the Meridian 1, if the maximum number of trunks defined for a service has been reached, the Meridian 1 will return a “Release Complete” message to the Central Office, with the “Cause” value set to “User Busy”. This allows the Central Office to return a busy tone to the caller.

Service routes for public network calls

NI-2 Call By Call Service Selection uses the Network Specific Facility (NSF) Information Element (IE) to indicate the requested service in the call request. If no NSF IE is included, the call is treated as a TR-1268 public network call (CO or DID).

Multiple service routes can be configured on a master route to serve outgoing public network calls, but only one service route may be specified in the master route to serve incoming public network calls (this is done using the IPUB prompt in Overlay 16). The route type for these service routes may be COT and DID. The result is that a system may be configured to handle public network calls with one incoming route and multiple outgoing routes, or one incoming and outgoing route with multiple outgoing routes.

NI-2 CBC service route treatment

Each service route stores the information, pertaining to a particular subscribed service, required to initiate or terminate a call. The information is transmitted to, or received from, the network by means of an NSF IE contained in the outgoing or incoming SETUP message.

Originating treatment (Meridian 1 to Central Office)

The Meridian 1 can designate the desired service to the Central Office, on a call-by-call basis. This is done by means of an NSF IE in the outgoing SETUP message. The NSF IE is built using the information configured in the service route. The SETUP message is sent by seizing a B-channel from a pool of channels associated to the CBC master route.

Termination treatment (Central Office to Meridian 1)

The Central Office, when offering a call to the Meridian 1 over the CBC master route, indicates in the NSF IE the type of service of the incoming call. The NSF IE contains the information required to identify a service route and to handle further call processing. The termination of NI-2 CBC service routes is based on the existing Nortel’s Integrated Services Access feature (ISA) call by call service treatment, and summarized in Table 62.

Table 62
Call termination for NI-2 CBC service route

TKTP	AUTO ^a = No				AUTO = Yes	
	DNIS ^b = No		DNIS = Yes		DNIS = No	DNIS = Yes
	IDC ^c = No	IDC = Yes	IDC = No	IDC = Yes		
COT	attendant	N/A ^d	N/A	N/A	AUDN ^e	N/A
FEX	attendant	IDC digit	N/A	IDC digit	AUDN	N/A
WAT	attendant	IDC digit	N/A	IDC digit	AUDN	AUDN ^f
DID	last n CAD digit ^g	IDC digit	N/A	IDC digit	AUDN	AUDN ^h
TIE	CAD	IDC digit	N/A	IDC digit	AUDN	AUDN ⁱ

a. AUTO = Autoterminate.

b. DNIS = Direct Number Identification Service.

c. IDC = Incoming Digit Conversion.

d. N/A = Not supported.

e. AUDN = Autoterminate DN. AUDN in LD 16 has the same significance as ATDN in LD 14.

f. Must be an ACD DN.

g. Last n CAD digit = the last n digits of the Called Party Number IE, where 'n' is defined using prompt LDN0 in LD 15.

h. Must be an ACD DN.

i. Must be an ACD DN.

Differences between ISA, CBC, and NI-2 CBC

Table 63 summarizes the differences between Nortel's ISA, Lucent's Call By Call Service Selection, and NI-2 Call By Call Service Selection.

Table 63
Differences between Nortel's ISA, Lucent's CBC, and NI-2 CBC

Nortel ISA	Lucent CBC	NI-2 CBC
Proprietary (interface specific to DMS-100 and DMS-250).	Proprietary (interface specific to Lucent 5ESS Local Exchange Carriers).	Bellcore-based standard CBC service (independent of switch type).
Services: — Public — PRIVATE — INWATS — OUTWATS — TIE — FX	Services: — ACCUNET — SDN — MEGACOM — MEGACOM 800 — WATB — WATM — LDS — IWAT — 1800	Standardized Services: — TR-1268 Public (CO or DID) — FX — TIE — OUTWATS (IntraLATA, Bands, and InterLATA) — INWATS Non-standardized Services: — e.g., Lucent proprietary services, as follows: • Access to operator • Access to Exchange Carrier Services (call by call services) • Access to Virtual Private Network • MEGACOM/MEGACOM 800 • ACCUNET switched digital service • International long distance service • International 800 • Electronic Tandem Network • Private Virtual Network • DIAL IT and Lucent MultiQuest

Nortel ISA	Lucent CBC	NI-2 CBC
CBC calls are routed according to the Service Identifier in the Service Parameter of the NSF IE.	CBC calls are routed according to the service specified by the Facility Coding Value in the NSF IE.	CBC calls are routed according to the service specified by the Facility Coding Value and the Service Parameter in the NSF IE.
Up to 512 service routes can be configured on the Meridian 1 (one per Service Identifier value), enabling access to 512 possible services.	Only one service route can be configured per service type on the Meridian 1, enabling access to only nine possible services. — 1 ACCUNET — 1 SDN — 1 MEGACOM — 1 MEGACOM 800 — 1 WATB — 1 WATM — 1 LDS — 1 IWAT — 1 I800	Up to 512 service routes can be configured on the Meridian 1, enabling access to a maximum of 512 possible services ^a . — Public ^b (COT or DID) — 1 INWATS — OUTWATS (98 bands, 1 IntraLATA, 1 InterLATA) — Up to 512 FX or TIE (for FX and TIE, a Facility Number may be assigned in LD 16 for each service route)
The operation mode for TIE trunks is senderized (see footnote a).	N/A	The operation mode for TIE trunks may be senderized ^c or cut-through ^d (Release 23 supports senderized mode only).
The minimum and maximum function are defined on a per service route basis.	The minimum and maximum function are defined on a per service route basis.	The maximum value is defined on a per service route basis (a maximum is required by the Bellcore Specification). The maximum value is also defined by the serving Central Office. There is no minimum value allowed by the Bellcore Specification.

One Public service route (no NSF IE) can be configured for multiple incoming and outgoing trunks, with a maximum and a minimum value.	N/A	A system may be configured to handle public network calls with one incoming route and multiple outgoing routes, or one incoming and outgoing route with multiple outgoing routes. The route type for these service routes may be COT and DID.
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- a. The maximum cannot be greater than 512 for all call types.
- b. Multiple service routes can be configured on a master route to serve outgoing public network calls, but only one service route may be specified in the master route to serve incoming public network calls. The route type for these service routes may be COT and DID. The result is that a system may be configured to handle public network calls with one incoming route and multiple outgoing routes, or one incoming and outgoing route with multiple outgoing routes
- c. For a TIE trunk operating in senderized mode, the Central Office collects and screens the called digits before sending the digits to the Class II equipment or PBX at the end of the TIE trunk.
- d. For a TIE trunk operating in cut-through mode, the Central Office does not collect the called digits. The Class II equipment or the switch at the end of the TIE trunk are allowed to exchange inband information, such as dial tone and address information.

Operating parameters

For Release 23, NI-2 Call By Call Service Selection does not support the TIE trunk cut-through mode.

The maximum number of NI-2 Call By Call Service Selection routes that can be configured on a Meridian 1 is 512.

The maximum number of trunks per route is 254 per master route.

Feature interactions

Calling Party Privacy

The Calling Party Privacy feature allows a user the option of restricting the display of the calling number on the set of the called party. The INWATS service requires that the CLID always be displayed. Therefore, subscribers to INWATS cannot restrict the display of the calling number, even though they have the Calling Party Privacy feature active.

Feature packaging

The NI-2 Call By Call Service Selection feature requires the NI-2 Call By Call (CBC_PKG) package 334.

The following packages are also required as dependencies:

- National ISDN-2 (NI2) package 291
- Integrated Services Digital Network (ISDN) package 145
- Primary Rate Access (PRA) package 146
- Multi-purpose Serial Data Link (MSDL) package 222

Traffic measurement output

The TFC002 traffic report has been updated for NI-2 CBC as shown by Table 64:

Table 64
TFC002 NI-2 CBC trunks format

System ID	TFC002
Customer Number	
Route Number	Trunk Type
Trunks equipped	Trunks working
Incoming usage	Incoming peg count
Outgoing usage	Incoming peg count
Outgoing overflow	All trunks busy
Toll peg count	
Incoming CBC peg count	Outgoing CBC peg count

Trunk Type

For an NI-2 CBC master route, 'CBCT' is output in this field. For an NI-2 CBC service route, one of the following is output in the field, based on the trunk type of the route:

- FEX
- TIE
- CO
- DID
- WATS

Trunks Equipped

This field indicates the total number of trunks configured for the NI-2 CBC master route (this field would always be 0 for service routes).

Trunks Working

This field indicates the total number of trunks enabled (working) for the NI-2 CBC master route (this field would always be 0 for service routes).

Incoming usage

This field indicates the total number of incoming routes, for both the NI-2 CBC master route and service routes.

Outgoing usage

This field indicates the total number of outgoing routes, for both the NI-2 CBC master route and service routes.

Outgoing overflow

This field indicates the number of outgoing overflow routes for the NI-2 CBC master route (this field would always be 0 for service routes).

Toll peg count

This field indicates the toll peg count for the NI-2 CBC master route (this field would always be 0 for service routes).

Incoming peg count

This field indicates the incoming peg count increment when an incoming trunk call on the NI-2 CBC master route becomes idle (this field would always be 0 for service routes).

Outgoing peg count

This field indicates the outgoing peg count increment when an outgoing trunk call on the NI-2 CBC master route becomes idle (this field would always be 0 for service routes).

All Trunk Busy

This field indicates the increment when all trunks (incoming and outgoing) on the NI-2 CBC master route becomes busy. For a service route, this field indicates the increment when the number of calls (both incoming and outgoing) for the service route has reached its maximum value.

Incoming CBC peg count

This field indicates the incoming peg count for an NI-2 CBC service route.

Outgoing CBC peg count

This field indicates the outgoing peg count for an NI-2 CBC service route.

Feature implementation

To configure NI-2 CBC, the following implementation must be performed:

- Load Overlay 17 and configure the NI-2 Basic Call Service.
- Load Overlay 16 and configure a trunk route as an NI-2 Call By Call Service Selection master route.
- Load Overlay 14 and define the associated list of trunks (B-channels) that are to be shared by the NI-2 CBC service routes.
- Load Overlay 16 and define the NI-2 CBC service routes.

LD 17 – Configure the primary D-channel for the NI-2 Basic Call Service.

Prompt	Response	Description
REQ	NEW	Add new data.
TYPE	CFN	Configuration Record.
ADAN	NEW DCH xx	Add a primary D-channel where: xx = 0-63.
CTYP	MSDL	Supported only on Multi-purpose Serial Data Link (MSDL) or Downloadable D-channel cards.
...		
USR	PRI	D-channel mode.
IFC	NI2	NI-2 TR-1268 interface type.
CO_TYPE		Central Office switch type (prompted only if IFC = NI2).
	(STD)	STD = Totally compatible with Bellcore standard.
	ATT	ATT = Lucent 5ESS.
PRI	Ill nn	Ill = PRI loop using the same D-channel (0,1,...159) nn = Interface identifier (2-15)
...		

LD 16 – Configure the NI-2 Call By Call Service master route.

Prompt	Response	Description
REQ	NEW CHG	Add new data. Change existing data.
TYPE	RDB	Route Data Block.
DMOD	1-127	Default Model number for this route (Option 11)
CUST	xx	Customer number.
ROUT	0-511 0-127	Route number. For Option 11C.
TKTP	CBCT	The trunk type is a Call By Call master route.
...		
ISDN	YES	ISDN route.
- IFC	NI2	Interface type is NI-2.
- IPUB	0-511 0-127	Service route to be used for incoming network calls. For Option 11C.
...		
- - PNI	1-32700	Private Network Identifier.
...		
ICOG	IAO ICT OGT	IAO = The trunk is incoming and outgoing. ICT = The trunk is incoming only. OGT = The trunk is outgoing only.
...		

LD 14 – Define the associated list of trunks (B-channels) that are to be shared by the NI-2 CBC service routes

Prompt	Response	Description
REQ	NEW CHG	Add new data. Change existing data.
TYPE	CBCT	Call By Call trunk.
TN	l ch	Loop and channel for digital trunks, where: l = Previously defined loop number (0-159). ch = channel (1-24).
CUST	xx	Customer number.
RTMB	0-511,1-254	CBC master route and member number.
...		

LD 16 – Configure the NI-2 CBC service routes.

Note: Up to 512 service routes can be configured using this procedure.

Prompt	Response	Description
REQ	NEW CHG	Add new data. Change existing data.
TYPE	RDB	Route Data Block.
...		
TKTP	TIE COT DID WAT FEX	Service trunk type. TIE Central Office Direct Inward Dial Wide Area Telecommunications Service Foreign Exchange
...		
ISDN	YES	ISDN route.
- IFC	NI2	Interface type is NI-2.
- CBCR	YES	Service route indicator.
- - RTN	0-511 0-127	Master route number, as previously defined in LD 16, with which the service routes are associated. For Option 11 C.
- - SRVC	(0)-31	Decimal value of the service provisioned for NI-2. Prompted only if IFC = NI2. 0 = Public call service 19 = FX (Foreign Exchange) service 20 = TIE service 17 = Inward Wide Area Telecommunications Service (INWATS) service 18 = Outward Wide Area Telecommunications Service (OUTWATS) service. Lucent proprietary call by call services may also be defined here. Refer to page 513 for a list of these values.

-- FACN	(0)-99999	TIE or FX facility number. Prompted only if IFC = NI2, and SRVC = 19 (FX) or 20 (TIE).
-- BAND	(0)-99	OUTWATS band number. Prompted only if IFC= NI2 and SRVC = 18 (OUTWATS).
-- IEC	(0)-xxx (0)-xxxx	Inter-Exchange Carrier providing the service. Prompted if IFC = NI2 and SRVC = 0-16, 18, or 21-31.
-- MAX	xxx	Maximum number of trunks for the service route. This value must be the same as the value assigned by the Central Office at the time of subscription.
...		

Sample configuration

The following provides a sample configuration of the NI-2 CBC feature.

Load Overlay 17 and configure a primary D-channel for the NI-2 Basic Call Service.

Prompt	Response	Description
REQ	NEW	Add configuration information.
TYPE	CFN	Configuration Record.
ADAN	NEW DCH 1	Add a primary D-channel for NI-2, where 1 is the primary D-channel number.
CTYP	MSDL	Supported only on Multi-purpose Serial Data Link (MSDL) or Downloadable D-channel cards.
...		
USR	PRI	D-channel mode.
IFC	NI2	NI-2 TR-1268 interface type.
CO_TYPE	STD	Central Office switch type for the NI-2 interface. STD = Totally compatible with Bellcore standard.
PRI	1 2	1 = PRI loop using the same D-channel (0,1,...159) 2 = Interface identifier (2,3,...15)
...		

Load Overlay 16 and configure a trunk route as an NI-2 Call By Call Service Selection master route.

Prompt	Response	Description
REQ	CHG	Change data.
TYPE	RDB	Route Data Block.
DMOD	1-127	Default Model number for this route (Option 11)
CUST	0	Customer number.
ROUT	0	Master route number.
TKTP	CBCT	The trunk type is a Call By Call master route.
DTRK	YES	Trunk route is digital.
DGTP	PRI	Trunk type is digital.
ISDN	YES	ISDN is used.
...		
- IFC	NI2	Interface type is NI-2.
- IPUB	1	Service route for incoming public network calls.
...		
- - PNI	1	Customer's Private Network Identifier.
...		
ICOG	IAO	The trunk is incoming and outgoing.
...		

Load Overlay 14 and define the associated list of trunks (B-channels) that are to be shared by the NI-2 CBC service routes.

Prompt	Response	Description
REQ	CHG	Change data
TYPE	CBCT	Call By Call trunk.
TN	0 1	Loop and channel for digital trunks, where: 0 = Previously defined loop number (0-159). 1 = channel (1-24).
CUST	0	Customer Number.
RTMB	0 1	CBC master route and member number.
...		

Load Overlay 16 and define the NI-2 CBC service routes. Up to 512 service routes can be configured using this procedure.

Prompt	Response	Description
REQ	NEW,CHG	Add or change data.
TYPE	RDB	Route Data Block.
CUST	0	Customer number.
ROUT	1	Service route number.
...		
TKTP	TIE	Service trunk type.
...		
ISDN	YES	ISDN route.
- IFC	NI2	Interface type is NI-2.
- CBCR	YES	Service route indicator.
- - RTN	0	Master route number, as previously defined in LD 16, with which the service routes are associated.

-- SRVC	20	Decimal value of for TIE service.
-- FACN	20	TIE Facility Number.
-- MAX	1	Maximum number of trunks for the service route. This value must be the same as the value assigned by the Central Office at the time of subscription.
...		

Feature operation

No specific operating procedures are required to use this feature.

Feature testing

Test each PRI trunk to ensure that the Meridian 1 completes an NI-2 CBC call. Run the following test for each of the available call types: TIE, Public (COT, DID), FX, INWATS, and OUTWATS.

To test NI-2 CBC, follow steps 1 through 8.

- 1** Select a PRI to be tested.
- 2** Access LD 60. Use STAT command on all pertinent B-channels.
- 3** Set all the Maximum value in all service routes to 1 (the Central Office must define the same value, that is, 1).
- 4** Make a test call on a trunk route that accesses the PRI being tested. Be sure the test call is to a valid destination.
- 5** Use LD 80 to ensure a B-channel from the NI-2 CBC pool is in use. Then:
 - Place the call on hold.
 - Make another call. You should receive an overflow signal (fast busy).
 - Repeat this procedure for every outgoing service route.
- 6** Disconnect both calls.

- 7 Ask the terminating end to place an incoming call for each incoming call type, then:
- Place the call on hold.
 - Ask the terminating end to place another call. They should receive an overflow signal (fast busy).
 - Disconnect both calls.